



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/987,475	11/14/2001	Kristofer Kjorling	0226-0111P	7069

2292 7590 11/16/2004

BIRCH STEWART KOLASCH & BIRCH  
PO BOX 747  
FALLS CHURCH, VA 22040-0747

EXAMINER

NOLAN, DANIEL A

ART UNIT PAPER NUMBER

2654

DATE MAILED: 11/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/987,475

Applicant(s)

KJORLING ET AL.

Examiner

Daniel A. Nolan

Art Unit

2654

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 14 November 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9, 11 and 12 is/are rejected.
- 7) ☒ Claim(s) 10 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 09/17, 12/23/2002
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Specification***

1. The disclosure is objected to because of the following informalities:

- "Gaussian" should be capitalized (1<sup>st</sup> line page 9).

Appropriate correction is required.

5. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested:

"Enhancing Perceptual Performance Of High Frequency

Reconstruction Coding Methods By Adaptive Filtering".

### ***Claim Objections***

2. Claims 1, 3, 7 and 12 are objected to because of the following informalities:

- In claim 1, the acronym HFR should be defined at its initial appearance in the claims (at the 7<sup>th</sup> line rather than the 11<sup>th</sup>).
- In claims 1 and 12, the preambles should be restated to read, "... *for enhancement of high-frequency reconstruction audio source coding systems*" to prevent errors of

misunderstanding by making it clear that "HFR" would defines decoding, as opposed to its being the *enhancement* claimed.

- In claim 3, the words redundant words "said that" should be removed (1<sup>st</sup> line).
- In claim 7, the term "a HFR" should be more definitively "the HFR" or "said HFR" to explicitly indicate the objective is the signal of claim 1 as opposed to being arbitrary.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 6 and 7 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Comparison of the function "q" of the claims is singular while the determinant "ratios" is plural, making it problematic even with undue experimentation whether the

Applicant intends for there to be multiple comparisons (one for each subband ratio "q") or a single comparison (with all subband ratios combined) with the "synthesized" HFR.

The Examiner is proceeding with the understanding that the single comparison specified in the 2<sup>nd</sup> line, "comparison of the tonal noise to signal ratios "q" of different subband signals obtained..." necessitates that the ratios are combined for the comparison.

6. Claim 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7. Claim 8 recites the limitation "the LPC predictor order" in claim 8.  
There is insufficient antecedent basis for this limitation in the claim.

### ***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2654

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**Zinser, Fogel & Sluijter et al**

10. Claims 1 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zinser (U.S. Patent 4,776,014 A) in view of Fogel (U.S. Patent 5,619,566 A) and further in view of Sluijter et al (U.S. Patent 6,772,114 B1).

11. Regarding claim 1, the invention of Zinser for pitch-aligned high-frequency regeneration in RELP vocoders reads on the claim *for enhancing audio source coding systems using high-frequency reconstruction* as follows:

- Zinser reads on the feature of *an encoder performed prior to storage or transmission* (20 in figure 2A), and
- Zinser reads on the feature of *a decoder performed after storage or transmission* (24 in figure 2B),

- Zinser reads on the feature of *estimating the tonal character of an original signal at a given time* (claim 4 line 50),

Zinser does not disclose *estimating spectral whitening*. The invention of Fogel for a *voice activity detector echo suppressor* reads on the feature of *estimating the required amount of spectral whitening at a given time* (9→19→5 in figure 2), *in order to obtain a similar tonal character after High Frequency Reconstruction HFR in the decoder, given the HFR-method used in the decoder; and*

Fogel reads on the feature in claim 11 of *transmitting information on the amount of spectral whitening from the encoder to the decoder* but does not *spectrally whiten before or after reconstruction at the decoder;*

Neither Zinser nor Fogel speak to HFR decoding. Sluijter et al, *with the invention for high frequency and low frequency audio signal encoding and decoding, read on the feature of, adaptively, spectrally whiten a signal prior to High Frequency Reconstruction (HFR) or after HFR, according to the spectral whitening information obtained from the encoder (49→59 in figure 3).*

It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Fogel to the device/method of Zinser to provide a leveled signal that focuses on voice in the transmitted path, and it would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Sluijter et al to the device/method of Fogel or Zinser to reduce storage and

transmission by filtering white noise on reconstitution to sufficiently match the original signal in the less stringent human auditory terms.

**Zinser, Fogel, Sluijter et al & Hertz et al**

12. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zinser in view of Fogel and further in view of Sluijter et al and further in view of Hertz et al (U.S. Patent 4,361,875 A).

13. Regarding claim 2, the claim is set forth with the same limits as claim 1. Neither Zinser nor Fogel nor Sluijter et al speak to *estimating tone for different frequencies*. Hertz et al, with the invention for *multiple tone detector and locator*, read on the feature *that the estimation of the tonal character of the original signal is done for different frequency regions* (1400 in figure 9 – see claim 6). It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Hertz et al to the device/method of Zinser or Fogel or Sluijter et al because any change in factor can cause a different region to be dominant.

**Zinser, Fogel, Sluijter et al & Yamasaki et al**

14. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zinser in view of Fogel and further in view of Sluijter et al and further in view of Yamasaki et al (U.S. Patent 5,995,561 A).



Art Unit: 2654

15. Regarding claim 3, the claim is set forth with the same limits as claim 1. Neither Zinser nor Fogel nor Sluijter et al speak to *estimating tone for different frequencies*. The invention of Yamasaki et al for *reducing noise correlation in a partial response channel* read on the feature *that the estimation of the required amount of spectral whitening is done for different frequency regions* (column 6 lines 54-58). It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Yamasaki et al to the device/method of Zinser or Fogel or Sluijter et al because Yamasaki et al teach that reducing the estimated bandwidth in correlation with the frequencies will optimize the estimation.

**Zinser, Fogel, Sluijter et al & Lee et al**

16. Claims 4 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zinser in view of Fogel and further in view of Sluijter et al and further in view of Lee et al (US 5,822,360 A).

17. Regarding claim 4, the claim is set forth with the same limits as claim 1. Neither Zinser nor Fogel nor Sluijter et al speak to *temporal whitening*. The invention of Lee et al for *transporting auxiliary data in audio signals* read on the feature *that the spectral whitening is performed in the time domain* (claim 6 line 23). It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Lee et al to the device/method of Zinser or

Art Unit: 2654

Fogel or Sluijter et al because time domain modeling to determine the spectral shape of the audio signal can be used to reduce the required power of the audio signal.

18. Regarding claim 8, the claim is set forth with the same limits as claim 1. Neither Zinser nor Fogel nor Sluijter et al speak to *LPC controlling whitening*. Lee et al read on the feature *that the amount of spectral whitening is controlled by the LPC predictor order* (claim 60 line 11 – see column 6 lines 4-11). It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Lee et al to the device/method of Zinser or Fogel or Sluijter et al because LPC provides a prediction gain that can be used to reduce the power of the audio signal.

**Zinser, Fogel, Sluijter et al & DeJaco et al**

19. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zinser in view of Fogel and further in view of Sluijter et al and further in view of DeJaco et al (US 5,915,235 A).

20. Regarding claim 5, the claim is set forth with the same limits as claim 1. Neither Zinser nor Fogel nor Sluijter et al mention *subband filter-bank whitening*. DeJaco et al, with the invention of an *adaptive equalizer preprocessor for mobile telephone speech coder to modify non-ideal frequency response of acoustic transducer*, read on the feature *that the spectral whitening is performed in a subband filter-bank* (Abstract lines

Art Unit: 2654

17-20 – see lines 12-14). It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of DeJaco et al to the device/method of Zinser or Fogel or Sluijter et al to provide a target for impressing a spectrum that is closer to the ideal frequency response.

**Zinser, Fogel, Sluijter et al & Kirsteins et al**

21. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zinser in view of Fogel and further in view of Sluijter et al and further in view of Kirsteins et al (US 6,249,762 B1).

22. Regarding claim 6, the claim is set forth with the same limits as claim 1. Neither Zinser nor Fogel nor Sluijter et al mention *subband ratio whitening*. Kirsteins et al, with the invention *for separation of data into narrowband and broadband time series components*, read on the feature *that the estimation of required amount of spectral whitening is done by comparison of the tonal to noise signal ratios  $q$  of different subband signals obtained from subband filtering of the original signal ( $f_1 \dots f_m$  in figure 2) where the ratios are obtained using linear prediction of the subband signals* (4<sup>th</sup> line of Abstract – see column 3 lines 43-45). It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Kirsteins et al to the device/method of Zinser or Fogel or

Sluijter et al to isolate undesired random signals and prevent leakage into adjacent subbands.

**Zinser, Fogel, Sluijter et al & Gao et al**

23. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zinser in view of Fogel and further in view of Sluijter et al and further in view of Gao et al (US 6,574,593 B1).

24. Regarding claim 9, the claim is set forth with the same limits as claim 1. Neither Zinser nor Fogel nor Sluijter et al mention *subband ratio whitening*. The invention of Gao et al for *codebook tables for encoding and decoding* read on the feature *that the amount of spectral whitening is controlled by the bandwidth expansion factor of the LPC polynomial (column 31 line 56 to column 32 line 2)*. It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Gao et al to the device/method of Zinser or Fogel or Sluijter et al to provide additional robustness against signal and round-off errors during subsequent encoding.

**Zinser, Fogel, Sluijter et al, DeJaco et al & Borsuk et al**

25. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zinser in view of Fogel and further in view of Sluijter et al and further in view of DeJaco et al and further in view of Borsuk et al ("CCD Adaptive Filtering For Robust LPC Speech

Processing", IEEE International Conference on Acoustics, Speech, and Signal Processing, Apr 1979).

26. Regarding claim 11, the claim is set forth with the same limits as claim 5. Neither Zinser nor Fogel nor Sluijter et al nor DeJaco et al include pre-filtering in LPC estimations. Borsuk et al, with the paper describing a chip that *can be used as a pre-filter noise canceller, analysis filter, or pre-whitener for a pitch extractor* read on the feature that pre-filtering is included in the LPC estimation in order to compensate for the characteristic of the filter-bank analysis filters. It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Borsuk et al to the device/method of Zinser or Fogel or Sluijter et al or DeJaco et al to improve robustness by limiting system degradation.

### ***Allowable Subject Matter***

27. Claim 7 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

28. Claim 10 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

29. As allowable subject matter has been indicated, applicant's reply must either comply with all formal requirements or specifically traverse each requirement not complied with. See 37 CFR 1.111(b) and MPEP § 707.07(a).

30. The following is a statement of reasons for the indication of allowable subject matter:

- The present invention is directed to *audio coding for high-frequency regeneration*.
- Claim 7 identifies the uniquely distinct feature "*that the estimation of required amount of spectral whitening is done by comparison of the tonal to noise signal ratios of different subband signals obtained from subband filtering of the original signal and a HFR signal, where the ratios are obtained using linear prediction of the subband signals, and the HFR signal is produced in a the same manner as the HFR in the decoder*".

The closest prior art, Smyth et al, discloses *multi-channel predictive subband audio coder in frequency and time* but does not apply analysis-by-synthesis techniques with subbands as speech and HFR as synthesis. Because *that which only the inventor taught cannot be used against the teacher*, the prior art of reference fails to anticipate or render the above underlined limitations obvious.

- Regarding claim 10, the feature *that the amount of spectral whitening is controlled by the blending factor b* is neither anticipated nor is it found in obvious combination in the prior art of record.

### ***Conclusion***

31. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Bredemann et al ("Block Adaptive Filtering With Application To Real-Time Broadband RF Spectral Whitening", Conference Record of the Twenty-Ninth Asilomar Conference on Signals, Systems and Computers, Nov. 1995) increases the frequency content of signals which can be adaptively processed in real time, estimating sampling averages rather than instantaneous values of signals.
- Liljeryd et al (U.S. Patent 6,680,972 B1) source coding enhancement using spectral-band replication.
- Makhoul et al ("High-Frequency Regeneration In Speech Coding Systems", IEEE International Conference Acoustics, Speech, and Signal Processing, April 1979) In high-frequency regeneration (HFR) followed by spectral flattening, a noise source is added at high frequencies to compensate for lack of energy during certain sounds.
- Mignone et al ("CD3-OFDM: A Novel Demodulation Scheme For Fixed And Mobile Receivers", IEEE Transactions on Communications, Sept. 1996) does not transmit pilot tones on additive white Gaussian noise.
- Chang (U.S. Patent 5,347,611 A) for transparent tone passing over narrowband digital channels.

- Kenmochi et al (Japan Patent 2002-202790) teaches that an amplitude spectral envelope of a stochastic component is flattened in advance by some means (whitening) to eliminate the influence of the tone color of the original vowel. The spectrum appears flat due to the whitening.
- Akagiri (U.S. Patent 5,621,856 A) digital encoder with dynamic quantization bit allocation.
- Fogel (U.S. Patent 5,619,566 A) voice activity detector echo suppressor.

32. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel A. Nolan whose telephone number is (703)305-1368. The examiner can normally be reached on Mon, Tue, Thu & Fri, from 7 AM to 5 PM. If attempts to contact the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil, can be reached at (703)305-9645.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at (866)217-9197 (toll-free).

The fax phone number for the organization where this application or proceeding is assigned is (703)872-9306. The fax phone number for Technology Center 2600 is



Application/Control Number: 09/987,475  
Art Unit: 2654

Page 16

(703)872-9314. Label informal and draft communications as "DRAFT" or  
"PROPOSED", and designate formal communications as "EXPEDITED PROCEDURE".

Formal response to this action may be faxed according to the above instructions,

or mailed to:

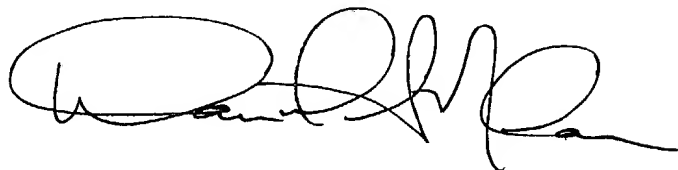
P.O. Box 1450  
Alexandria, VA 22313-1450

or hand-deliver to: Crystal Park 2,  
2121 Crystal Drive, Arlington, VA,  
Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or  
proceeding should be directed to Technology Center 2600 Customer Service Office at  
telephone number (703) 306-0377.

Daniel A. Nolan  
Examiner  
Art Unit 2654

DAN/d  
November 8, 2004

A handwritten signature in black ink, appearing to read 'Daniel A. Nolan', with a large, stylized initial 'D' and 'N'.

**DANIEL NOLAN**  
**PATENT EXAMINER**